

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 09/772,445  
Applicant : KLEINMAN et al.  
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TC/A.U. : 1654  
Examiner : Ronald T. Niebauer

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**DECLARATION UNDER 37 C.F.R § 1.132**

Director of the United States Patent  
and Trademark Office  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Dear Sir:

I, H. Paul Ehrlich, declare that:

1. I am a professor of Surgery and Cellular and Molecular Physiology at the Hershey Medical Center, Penn State University College of Medicine. I was awarded a Ph.D. degree from the University of California at San Francisco. I am a recognized expert in the field (my *Curriculum Vitae* is attached as Exhibit A). I am on the Editorial Advisory Board of the journals *Wound Repair and Regeneration* and *Journal of Burn Care and Rehabilitation*. In 2010, I received the Lifetime Achievement Award from the Wound Healing Society. I have studied wound healing, tissue repair and tissue regeneration for over three decades. I have also studied the properties and therapeutic actions of thymosin peptides and have conducted and/or supervised many laboratory studies over that period of time. I also have authored or co-authored books and numerous scientific papers in this area. A copy of my curriculum vitae is attached.

2. I have reviewed and am familiar with U.S. Patent Application Serial Number 09/772,445 entitled "Compositions and Methods for Promoting Wound Healing and Tissue Repair."
3. I understand that the claims of the above-referenced U.S. patent application have been rejected on the basis of an article by S.N. Turischev, which has been translated from Russian and the translation has been supplied to the applicants by the U.S. Patent and Trademark Office, entitled "[Study of the effect of thymosin on the healing of flat skin wounds in rats," as evidenced by U.S. Patent No. 6,030,948 to Mann, or in combination with other references.
4. I have been informed that it is the position of the U.S. Patent and Trademark Office in an Office Action dated January 11, 2011, that Turischev describes experiments where Thymosin Fraction 5 (hereinafter "TF5") was administered either intraperitoneally or topically to rats having skin wounds, and that Turischev disclosed that there is acceleration of the healing rates at a dose of 0.8 ug/g TF5 by intraperitoneal administration.
5. I have been informed that the U.S. Patent and Trademark Office has acknowledged that Turischev does not disclose that TF5 contains thymosin beta 4 (hereinafter "T $\beta$ 4"), but that Mann (U.S. 6,030,948) disclosed that TF5 contains T $\beta$ 4 and thymosin alpha 1.
6. I have studied the English translation of the Turischev article and the Mann (U.S. 6,030,948) patent. For the following reasons, I believe that:
  - a) Turischev demonstrates that the effect of administering TF5 is unpredictable depending on the mode of administration;

b) Turischev discloses that the use of TF5 topically was detrimental to the wound healing process in rats;

c) Turischev demonstrates that only one out of the three tested dosage amounts of TF5 administered intraperitoneally to the rats, i.e., 0.8 µg/g, had a significant effect on wound healing;

d) Turischev demonstrates that increasing or decreasing the sole effective dosage amount resulted in a loss of effectiveness for accelerating wound healing compared to control;

e) it was unpredictable, in view of Mann, whether the effect demonstrated by Turischev was attributable to Tβ4, to thymosin alpha 1, or to a combination thereof; and

f) Turischev's method is directed specifically to accelerating skin wound healing, but not to a method for promoting tissue repair.

7. It is my expert opinion that persons of ordinary skill in the art reading Turischev as evidenced by Mann, would have found the results confounding and been unable to extract suggestions for obvious modifications and practical methods of using TF5. Persons of ordinary skill in the art would have found that it was unpredictable whether another form or administration of TF5 would have a positive effect (e.g., intraperitoneal at 0.8 µg/g), a negative effect (e.g., topical administration at 0.8 µg/g or 1.6 µg/g), or any effect at all (e.g., intraperitoneal administration at 0.2 µg/g or 1.6 µg/g) on wound healing.

8. It is my expert opinion that persons of ordinary skill in the art reading Turischev as evidenced by Mann, would have been dissuaded from using TF5 topically because Turischev discloses that TF5 administered topically caused “intensification and prolongation of the phase of inflammation” (page 4, lines 15-17), increased suppuration with increased TF5 dosage administered (page 4, lines 13-15), significantly slower healing and slower contraction of wounds compared to control (page 3, last two paragraphs), and “a trend toward lengthening of [the period for complete epithelialization (PCE)]” with increasing TF5 dose administered (page 5, lines 1-3).
9. It is my expert opinion that persons of ordinary skill in the art reading Turischev as evidenced by Mann, would have been dissuaded from using TF5 intraperitoneally at a dose other than 0.8 µg/g. Turischev discloses that dosages of 0.2 µg/g and 1.6 µg/g did not significantly accelerate wound healing compared to control (page 3, lines 5-15). Thus, persons of ordinary skill in the art would have found it useless to administer TF5 at a dose lower or higher than 0.8 µg/g.
10. It is my expert opinion that persons of ordinary skill in the art reading Turischev as evidenced by Mann, would not have known whether the effect on wounds observed at 0.8 µg/g TF5 was due to the activity of Tβ4, the activity of thymosin alpha 1, or the combined activity of Tβ4 and thymosin alpha 1. Mann discloses that “Tα1 and Tβ4 have been characterized with regard to their ability to...enhance wound healing....” Col. 4, lines 55-58. Accordingly, persons of ordinary skill in the art reading Mann would have been unable to determine what effect, if any, was attributable to Tβ4. Thus, persons of ordinary skill in the art would not have had any guidance as to how to use Tβ4 in a composition, e.g., at what concentration, at what dosage, alone or combined

with Tα1 and other thymus ingredients. Accordingly, it is my expert opinion that Turischev cannot be read as providing anything more than instructions to use TF5 at 0.8 µg/g intraperitoneally and no suggestions for modification or optimization of this method. The confounding results of Turischev compel this narrow reading.

11. Persons of ordinary skill in the art reading Turischev as evidenced by Mann, would have found Turischev's method at odds with a method for promoting tissue repair. It is my expert opinion, as evidence by Turischev, that there is a technical difference between the terms "wound healing" and "tissue repair." Turischev discloses that "[t]he use of T in our experiment probably **disrupts the balance of immunological components that is characteristic for repair** by stimulating mononuclear cells, which leads to prolonging of inflammation." Page 4 of the English translation of Turischev (emphasis added). Accordingly, persons of ordinary skill in the art reading Turischev, as evidence by Mann, would have understood that TF5 had negative effects on tissue repair.
12. That the method of Turischev has negative effects on tissue repair such as suppuration, which is commonly known as the formation of pus. When a tissue is suppurative, it recruits and contains large numbers of neutrophils in response to an infection causing inflammation and slowing repair of the tissue. Accordingly, because Turischev discloses that topical use of TF5 increased suppuration and that suppuration existed when using TF5 intraperitoneally, persons of ordinary skill in the art would have understood that Turischev's method did not promote tissue repair.
13. Experimental evidence has shown that administration of a composition containing synthetic Tβ4 decreases neutrophil recruitment and is characterized by a lack of suppuration. Accordingly, such compositions have been found to be antimicrobial and no suppuration has been reported when administering the

composition to any subject, including rats, mice, and human subjects. In an article by Young et al. entitled "Thymosin  $\beta_4$  sulfoxide is an anti-inflammatory agent generated by monocytes in the presence of glucocorticoids" published in Nature Medicine, Vol. 5(12), pages 1424-1427 (1999), the authors reported that synthetic thymosin B4 sulfoxide inhibited neutrophil chemotaxis (abstract; page 1424, right column, last paragraph). Further, in an article by Sosne et al. entitled "Thymosin- $\beta_4$  Modulates Corneal Matrix Metalloproteinase Levels and Polymorphonuclear Cell Infiltration after Alkali Injury" published in Investigative Ophthalmology & Visual Science, Vol. 46(7), pages 2388-2395 (2005), the authors demonstrated that T $\beta_4$  is a potent inhibitor of neutrophil infiltration after corneal injury. It has also been shown that T $\beta_4$  inhibits neutrophil migration in vivo (Sosne et al. "Thymosin- $\beta_4$  promotes corneal wound healing and decreases inflammation in vivo following alkali injury." *Exp Eye Res.* 2002;**74**:293–299).

14. The literature shows that "[t]he yield of thymosin  $\beta_4$  from fraction 5 is about 0.45%." Low et al., Proc. Natl. Acad. Sci., 1981, page 1163, 1<sup>st</sup> paragraph of the RESULTS. Thus, the composition that Turischev administered contained only 0.45% T $\beta_4$ . The compositions administered in the experiments conducted by the inventors of U.S. patent application number 09/772,445 that showed a significant effect contained at least 10% (5  $\mu$ g/ 50  $\mu$ l) T $\beta_4$ . See Example 1 of U.S. patent application number 09/772,445.
15. Based on the Low et al. reference, I have calculated that administration of 0.8  $\mu$ g/g TF5 is equivalent to administration of 3.6 ng/g T $\beta_4$ . Thus, Turischev administered a dose of 0.79  $\mu$ g total T $\beta_4$  to the largest rats (0.8  $\mu$ g/g x 220 grams x 0.0045 = 0.79  $\mu$ g) intraperitoneally to obtain a significant wound healing effect. The experimental results detailed in U.S. Patent Application Serial Number 09/772,445 demonstrate that there was no significant effect on

tissue repair when 6 µg or less Tβ4 was administered intraperitoneally or when 2.5 µg or less Tβ4 was administered topically, (see paragraph [0100] of 09/772,445). Thus, using the same weight for the rats, I have calculated that 27.3 ng/g (6 µg/220 g = 27.3 ng/g) or less Tβ4 is not effective when administered intraperitoneally and 11.4 ng/g (2.5 µg/220 g = 11.4 ng/g) Tβ4 is not effective when administered topically. In contrast to Turischev, the inventors of U.S. Patent application 09/772,445 have disclosed a method to effectively promote tissue repair in rats by administering Tβ4 topically. Further, the inventors of U.S. Patent application 09/772,445 have disclosed a method to effectively promote tissue repair in rats by administering Tβ4 systemically by administering greater than 6 µg Tβ4.

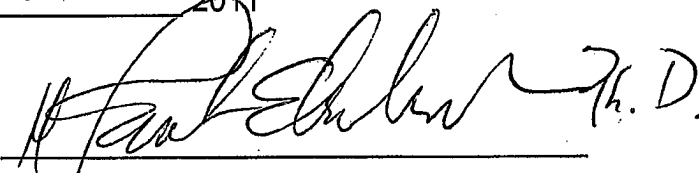
16. Turischev discloses that each TF5 dose was diluted in 0.5 mL physiological solution before being administered to the rats. Accordingly, the concentrations of Tβ4 in the compositions administered at the 0.2 µg/g, 0.8 µg/g, and 1.6 µg/g doses to the largest rat were 0.2 µg/500 µL, 0.79 µg/500 µL, and 1.58 µg/500 µL, respectively, i.e., 0.04% w/v, 0.16% w/v, 0.32% w/v, respectively.
17. It is my expert opinion that, because Turischev disclosed that TF5 was only effective at a dose of 0.8 µg/g TF5, i.e., 3.6 ng/g Tβ4, when administered intraperitoneally, it clearly did not disclose administering greater than 6 µg, i.e., 27.3 ng/g Tβ4, intraperitoneally, and taught away from modifications such as increasing or decreasing the dosage because 1.6 µg/g TF5, i.e., 7.2 ng/g Tβ4, or 0.2 µg/g TF5, i.e., 0.9 ng/g Tβ4, **were both ineffective**.
18. It is my expert opinion that persons of ordinary skill in the art reading Turischev as evidenced by Mann would not have known or been able to predict that a composition containing Tβ4 could have a positive tissue repair effect when administered topically **at any** concentration. Rather, it is clear that persons of

ordinary skill in the art reading Turischev would have learned to avoid using TF5 topically because TF5 was shown to cause "intensification and prolongation of the phase of inflammation" (page 4, lines 15-17), increased suppuration with increased TF5 dosage administered (page 4, lines 13-15), significantly slower healing and slower contraction of wounds compared to control (page 3, last two paragraphs), and "a trend toward lengthening of [the period for complete epithelialization (PCE)]" with increasing TF5 dose administered (page 5, lines 1-3).

19. All statements made herein of my own knowledge are true and all statements made on information and belief, are believed to be true. These statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Dated this 8 day of June 2011

Signed

  
H. Paul Ehrlich, Ph.D.



## Curriculum Vitae

Name: H. Paul Ehrlich

Date of Birth: August 17, 1941

Place of Birth: Honolulu, Hawaii

### Education:

- 1964 B.S. University of California at Berkeley
- 1966 M.A. San Francisco State University
- 1970 Ph.D. University of California at San Francisco

### Research Fellowships and Postdoctoral Training:

1971-73 NIH-Traineeship, Departments of Biochemistry and Medicine, University of Washington, Seattle, WA

1973-75 British-American Heart Research Fellow, Strangeways Research Laboratory, Cambridge, England

Young Investigator Fellowship:

1977-81 Established Investigator of the American Heart Association

### Academic and Hospital Appointments:

1994 - Present Professor of Surgery and Cellular and Molecular Physiology,  
Hershey Medical Center, Penn State University College of Medicine

1984-1994 Associate Professor of Pathology - Harvard Medical School

1988-1994 Associate in Biochemistry in the Department of Surgery, and Division of Plastic Surgery, Massachusetts General Hospital

1986-1994 Associate Biochemist in the Department Pathology, Mass General Hospital

1984-1994 Clinical Research Center Affiliate, Massachusetts Institute of Technology, Cambridge, MA

1975-1984 Assistant Professor of Pathology, Harvard Medical School

1975-1986 Assistant Biochemist Department Pathology, Mass General Hospital

1975- 1993 Assistant in Biology, Shivers Burns Institute

1974-1975 Fellow Clare Hall College, Cambridge University, Cambridge, England

### Other Professional Positions:

1977-1994 Director, Wound Healing Research Laboratory, Shivers Burns Institute  
Massachusetts General Hospital

1994-1998 Director, Wound Healing Research Laboratory, Division of Pediatric Surgery,  
Department of Surgery, Hershey Medical Center.

1998-present Director, Wound Healing Research Laboratory, Division of Plastic Surgery,  
Department of Surgery, Hershey Medical Center.

### Awards and Honors:

- 1954 National Outstanding Achievement Award: Ford Motor Company Industrial Arts Award in Ceramics.
- 1977-1981 Established Investigator of the American Heart Association
- 1993 Visiting Professor, Department of Pathology, University of Geneva, Switzerland
- 1995 Outstanding Service Award from the Wound Healing Society
- 1996 Visiting Professor for The Japanese Society of Plastic and Reconstructive Surgery
- 2010 Lifetime Achievement Award Wound Healing Society

### Association Committee Assignments: (Massachusetts General Hospital Committees)

- 1977-1990 Committee on Review of Research Proposals: Subcommittee of Executive Committee on Research
- 1979-1984 Committee on Animal Care: Subcommittee of Executive Committee on Research

### (Hershey Medical Center Committees)

- 1994-present Surgery Department Committee of Research
- 1996-2011 Medical School Admissions Review Committee

### Memberships in Professional Societies:

- |              |   |
|--------------|---|
| 1977- 1983   | Atherosclerosis Council of the American Heart Association |
| 1978-present | The American Society for Cell Biology                     |
| 1980-present | American Association for the Advancement of Science       |
| 1980- 1998   | The American Burn Association                             |
| 1981-present | New York Academy of Sciences                              |
| 1989-present | Plastic Surgical Research Council                         |
| 1989-1992    | American Association of Pathologists                      |
| 1990-present | The Wound Healing Society founding member                 |

### Major Research Interests

1. Cell biology of wound healing and scar formation.
2. Gap junctional intercellular communications and wound repair and scarring
3. Matrix and non muscle cells interactions, mechanisms and regulations of the contraction process.
4. Mediators of inflammation and dermal damage.
5. Mast Cells signaling through gap junctional intercellular communications

### Editorial Advisory Board:

- 1986- Journal of Burn Care and Rehabilitation
- 1992- Wound Repair and Regeneration

### Editor in Chief

- 1990-2002 Scars and Stripes (The newsletter of the Wound Healing Society)

#### NIH Review Committee Member

- 1989 – 1999 An Ad Hoc member of the Surgery, Anesthesia and Trauma Study Section
- 1998 Surgery, Radiology and Bioengineering Initial Review Group
- 1999 - 2002 Musculoskeletal and Dental Sciences Special Emphasis Panel
- 2001 NIH Dental & Craniofacial Research Special Emphasis Panel B
- 2003 Reparative Medicine Study Section
- 2004 Musculoskeletal Oral & Skin Sciences Special Emphasis Panel
- 2009 Musculoskeletal, Oral & Skin Sciences Integrated Review Group

#### Bibliography

##### Books and Other Monographs

- Bornstein, P., K. von der Mark, H.P. Ehrlich, J.M. Monson (1973) The synthesis and secretion of collagen. 5th Annual Miami Winter Symposium. 6:263-270.
- Bornstein, P., H.P. Ehrlich (1973) The intercellular translocation and secretion of collagen. "Biology of Fibroblasts", eds. Kulonen, E., Pikkarainen, J. Academic Press, New York, pp. 585-590.
- Hunt, T.K., R. Allen, D. Kittridge, J. Niinikoski, H.P. Ehrlich (1973) Respiratory patterns of fibroblasts in reparative tissue. "Biology of Fibroblasts", eds. Kulonen, E., Pikkarainen, J., Academic Press, New York, pp. 585-590.
- Ehrlich, H.P., J.L. Gordon (1976) "Platelets in Biology and Pathology", chapter 14, ed. Gordon, J.L. Elsevier/North Holland Biomedical Press. Amsterdam, pp 353-372.
- Ehrlich, H.P. (1980) Culture of Aorta. "Methods and Perspectives in Cell Biology: Volume 21A", eds. Harris, C.C., Trump, B.F., Stoner, G.D. Academic Press, New York, pp. 117-134.
- Ehrlich, H.P. (1984) The role of connective tissue matrix in hypertrophic scar contracture, in "Soft and Hard Tissue Repair: Biological and Chemical Aspects", ed. by T.K. Hunt et al, Praeger Publication, New York. pp. 533-553.
- Ehrlich HP (1990) Healing, Scarring, and Contractures. In Wadstrom T, Eliasson I, Holden I, Ljungh A (eds), Pathogenesis of Wound and Biomaterial-Associated Infections, Verlag, London, pp. 15-23.
- Longaker MT, Adzick NS, Ehrlich HP (1992) Fetal Wound Contraction. In Adzick NS, Longaker MT (eds), Fetal Wound Healing, Elsevier Science Publishing Company, Inc., New York, pp. 149-160.
- Rudolph, R, Vande Berg, J, Ehrlich HP (1992) Wound Contraction and Scar contracture. In Cohen IK, Diegelmann RF, Lindblad WJ (eds), Wound Healing: Biochemical and Clinical Aspects, WB Saunders Company, Orlando, pp. 96-114.
- Ehrlich, HP (1993) New therapeutic possibilities. in "Leg Ulcers", edited by Westerhoff, W. Elsevier Scientific Publications B.V. Amsterdam, pp 357-364.
- Ehrlich, HP (1994) The role of the connective tissue matrix in wound healing: Fibroblast and collagen interactions. in "Wound Healing and Skin Physiology," edited by Altmeyer, P., Hoffmann, K., el-Gammal, S., Schatz, H. Springer-Verlag,

Heidelberg, pp 89-104.

Ehrlich, HP (1994) Why wounds need to be debrided. In "Proteolytic Enzymes and Wound Healing" edited by Westerhof, W, and Vanscheidt, W. Springer-Verlag, Heidelberg, pp 23-30.

Ehrlich, H.P. (1995) Biological consideration in the repair of hernias. in "Inguinal Hernia Repair" edited by V. Schumpelick and G.E. Wantz S. Karger AG, Basel, pp 22-28.

Ehrlich, HP (1995) Is collagen remodeling associated with bladder obstruction? in "Muscle Matrix and Bladder Physiology" Plenum Publishers, New York, pp 143-149

Ehrlich HP and Gottrup F. (1998) "Experimental Models in Wound Healing" in Harding, K.G. and Leaper, D.J., eds. Wounds Biology and Management, Oxford University Press pp. 41- 51.

Iocono JA, Ehrlich, HP, Gottrup F, Leaper, D.J. (1998) "The Biology of Healing" in Harding, K.G. and Leaper, D.J., eds. Wounds Biology and Management, Oxford University Press pp. 10 - 22.

Ehrlich HP (2000) "Collagen considerations in scarring and regenerative repair." In H Garg and M. Longaker eds Scarless Wound Repair, Marcel Dekker, Inc, New York, pp99 – 113.

Ehrlich HP (2001) "Possible Influence Upon Granulation Tissue Maturation by Vanadate and Implication on Grafted Cultured Skin Substitution". In R.E. Horch, A.M. Munster and B. Achauer: Cultured Human Keratinocytes and Tissue Engineered Skin Substitutes Springer-Verlag, Berlin. pp 83-90.

Ehrlich HP. (2006) The fibroblast populated collagen lattice: A model of fibroblast collagen interactions in repair. Loyola University at Chicago.

### **Journal Publications:**

Ehrlich, H.P., T.K. Hunt (1968) Effects of cortisone and Vitamin A on wound healing. Ann. Surg. 167:324-328.

Ehrlich, H.P., T.K. Hunt (1969) The effects of cortisone and anabolic steroids on the tensile strength of healing wounds. Ann. Surg. 170:203-206.

Hunt, T.K., Ehrlich, H.P., Garcia, J.A., Dunphy, J.E. (1969) Effects of vitamin A on reversing the inhibitory effect of cortisone on healing open wounds in animals and man. Ann. Surg. 170:663-641.

Ehrlich, H.P. Tarver H (1971) Effects of beta-carotene, vitamin A, and glucocorticoids on collagen synthesis in wounds. Proc. Soc. Exp. Biol. Med. 137:936-938.

Ehrlich, H.P., H. Tarver, T.K. Hunt (1972) Inhibitory effects of vitamin E on collagen synthesis and wound repair. Ann. Surg. 175:235-240.

Ehrlich, H.P., Tarver, H., Hunt, T.K. (1973) Effects of vitamin A and glucocorticoids upon inflammation and collagen synthesis. Ann. Surg. 177:222-226.

Ehrlich, H.P., Licko, V., Hunt, T.K. (1973) Kinetics of cephaloridine in experimental wounds. Am. J. Med. Sci. 265:33-44.

- Ehrlich, H.P., Bornstein P (1972) Further characterization of procollagen: The identification of a pro-alpha 2 chain. *Biochem. Biophys. Res. Com.* 46:1750-1756.
- Bornstein, P., H.P. Ehrlich, A.W. Wyke (1972) Procollagen: Conversion of the precursor to collagen by a neutral proteinase. *Science* 175:544-546.
- Bornstein, P., K. von der Mark, A.W. Wyke, H.P. Ehrlich, J.M. Monson (1972) Characterization of the pro-alpha 1 chain of procollagen. *J. Biol. Chem.* 247:2803-2813.
- Ehrlich, H.P., P. Bornstein (1972) Microtubules in transcellular movement of procollagen. *Nat. New Biol.* 238:257-260.
- Ehrlich, H.P., Grislis, G., Hunt, T.K. (1972) Metabolic and circulatory contributions to oxygen gradients in wounds. *Surgery* 72:578-583.
- Ehrlich, H.P., Tarver, H., Hunt, T.K. (1974) Proteolysis of preformed protein in wound nutrition. *Surgery* 76:263-266.
- Ehrlich, H.P., Ross, R., Bornstein, P. (1974) Effects of anti-microtubular agents on the secretion of collagen. *J. Cell Biol.* 62:390-405.
- Ehrlich, H.P., Grislis, G., Hunt, T.K. (1977) Evidence for the involvement of microtubules in wound contraction. *Am. J. Surg.* 133:706-709.
- Starkey PM, Gordon JL, Ehrlich HP, Barrett AJ. 1978 Do platelets contain elastase? *Thromb Haemost.* 39:542-543
- Ehrlich, H.P., B.S. White (1979) Zone precipitation chromatography: Its use in the isolation of different collagen types. *Prep. Biochem.* 9:407-425.
- Hornebeck W, Starkey PM, Gordon JL, Legrand Y, Pignaud G, Robert L, Caen JP, Ehrlich HP, Barrett AJ. 1980 The elastase-like enzyme of platelets. *Thromb Haemost* 42:1681-1683.
- Li, A.K.C., H.P. Ehrlich, R.L. Trelstad, M.J. Koroly, M.E., Shattenkerk, R.A. Malt (1980) Differences in healing of skin wounds caused by burn and freeze injuries. *Ann. Surg.* 191:244-248.
- Ehrlich, H.P., B.S. White (1981) The identification of A and B collagen chains in hypertrophic scar. *Exp. Mol. Path.* 34:1-8.
- Trelstad, R.L., Lawley, K.R., Hayashi, K., Ehrlich, H.P., Silver, F.H. (1981) Type V collagen from the chick embryo: Biochemical, physiochemical and ultrastructural characteristics. *Coll. Res.* 1:39-52.
- Ehrlich, H.P., R.L. Trelstad, J.T. Fallon (1981) Dermal vascular patterns in response to burn or freeze. *Exp. Mol. Path.* 34:281-289.
- Bell, E., Ehrlich, H.P., Buttle, D.J., Nakatsuji, T. (1981) Living tissues formed in vitro and accepted as full thickness skin equivalents. *Plast. Recon. Surg.* 67:386-392.
- Bell, E., H.P. Ehrlich, D.J. Buttle, T. Nakatsuji (1981) Living tissues formed in vitro and accepted as full thickness skin equivalents. *Science* 211:1052-1054.
- Ehrlich, H.P., H. Brown, B.S. White (1982) Evidence for type V and I trimer collagen in Dupuytren's contracture palmar fascia. *Biochem. Med.* 28:371-384.

- Ehrlich, H.P., D.J. Buttle, R.L. Trelstad, K. Hayashi (1983) Epidermolysis Bullosa dystrophica recessive fibroblasts in vitro physiological behavior within a collagen matrix. *J. Invest. Derm.* 80:56-60.
- Ehrlich, H.P., A.L. Needle, J. Rajaratnam, M.E. White, B.S. White (1983) The role of prostacyclin and thromboxane in rat burn and freeze injuries. *Exp. Mol. Path.* 38:357-367.
- Buttle, D.J., H.P. Ehrlich (1983) Comparative studies of collagen lattice contraction utilizing a normal and transformed cell line. *J. Cell Physiol.* 116:159-166.
- Ehrlich, H.P., A.L. Needle (1983) Wound healing in tight skin mice. *Plast. Recon. Surg.* 72:190-196.
- Ehrlich, H.P., D.J. Wyler (1983) Fibroblast contraction of collagen lattices in vitro: Inhibition by chronic inflammatory cell mediators. *J. Cell Physiol.* 116:345-351.
- Ehrlich, H.P., M.E. White (1983) Effect of increased concentrations of PGE levels with EBdr fibroblasts within a populated collagen lattice. *J. Invest. Derm.* 81:572-575.
- Ehrlich, H.P. (1984) Anti-inflammatory drugs in the vascular response to burn injury. *J. Trauma* 24:311-318.
- Ehrlich, H.P., D.J. Buttle (1984) Epidermis promotion of collagenase in hypertrophic scar organ cultures. *Exp. Mol. Path.* 40:223-234.
- Ehrlich, H.P. 1984 The connective tissue matrix control of cell mediated wound contraction and scar contracture. *J. Trauma* 24(S):35-39.
- Ehrlich, H.P. 1984 Anti-inflammatory drugs promotion of vascular patency following burn trauma. *J. Trauma* 24(S):12-18.
- Ehrlich, H.P. 1984 Promotion of vascular patency in dermal burns with Ibuprofen. *Am. J. Med.* 77:107-113.
- Ehrlich, H.P., T.R. Griswold (1984) Epidermolysis Bullosa dystrophica recessive fibroblasts produce increased concentrations of cAMP within a collagen matrix. *J. Invest. Derm.* 83:230-233.
- Graham, M.F., Dieglemann, R.F., Elson, C.O., Bitar, K.N., Ehrlich, H.P. (1984) Isolation and culture of human intestinal smooth muscle cells. *Proc. Soc. Exp. Biol. Med.* 176:503-507.
- Ehrlich, H.P., R.M. Hembry (1984) A comparative study of fibroblasts in healing freeze and burn injuries in rats. *Am. J. Path.* 117:218-224.
- Lange, K.C., Ehrlich, H.P., Newberne, P.M., Brown, H. (1984) Type V collagen as a marker in tendon healing. *Surg. Form.* 35:535-537.
- Ehrlich, H.P., Newberne, P.M., Brown, H. (1985) Type V collagen and vascularity in wound healing. *Surg. Form.* 36:253-256.
- Ehrlich, H.P., T.R. Griswold, J. Rajaratnam (1986) ATP induced contraction with Epidermolysis Bullosa dystrophica recessive and normal dermal fibroblasts. *J. Invest. Derm.* 86:96-100.
- Ehrlich, H.P., T.R. Griswold, J. Rajaratnam (1986) Studies of vascular smooth muscle cells and dermal fibroblasts in collagen matrices: Effects of heparin. *Exp. Cell Res.* 164:154-163.

- Brown, H., H.P. Ehrlich, P.M. Newberne, T. Kiyozumi. (1986) Paraosteopathy: Ectopic ossification of healing tendon about the rodent ankle joint: Histologic and type V collagen changes. *Proc. Soc. Exp. Biol. Med.* 183:214-220.
- Ehrlich, H.P., K.M. Borland, K.E. Muffly, P.H. Halls. (1986) Contraction of collagen lattices by peritubular cells from rat testes. *J. Cell Science* 82:281-294.
- Ehrlich, H.P., J.B.M. Rajaratnam, T.R. Griswold (1986) ATP induced cell contraction in dermal fibroblasts: Effects of cAMP and myosin light chain kinase. *J. Cell Physiol.* 128:223-230.
- Ehrlich, H.P., W.K. Jung, D.E. Costa, J.B.M. Rajaratnam (1986) The vascularization of artificial skin grafts in rats, its modification by protamine. *Exp. Mol. Path.* 45:68-75.
- Hembry, R.M., H.P. Ehrlich (1986) Immunolocalization of collagenase and tissue inhibitor of metalloproteinases (TIMP) in hypertrophic scar tissue. *Brit. J. Derm.* 115:409-420.
- Hembry, R.M., D.H. Bernanke, K. Hayashi, R.L. Trelstad, H.P. Ehrlich (1986) Morphological examination of mesenchymal cells in normal and tight skin mice healing wounds. *Am. J. Path.* 125:81-89.
- Borland, K., H.P. Ehrlich, K. Muffly, W.L. Dills Jr., P.F. Halls (1986) The interaction of rat Sertoli cells with a collagen lattice in vitro. *In Vitro Cell. Develop. Biol.* 22:661-669
- Doillon, C.J., R.M. Hembry, H.P. Ehrlich, J.F. Burke (1987) Actin filaments in normal dermis and during wound healing. *Am. J. Pathol.* 126:164-170.
- Ehrlich, H.P., U. MacGarvey, W.L. McGrane, M.E. White. (1987) Ibuprofen as an antagonist of inhibitors of fibrinolysis in wound fluid. *Thromb. Res.* 45:17-28.
- Ehrlich, H.P., W.L. McGrane, J.B.M. Rajaratnam (1987) Use of ancrod to prevent vascular occlusion in burns. *J. Trauma* 27:420-424.
- McLeod KJ, R.C. Lee, HP Ehrlich (1987) Frequency dependence of electric modulation of fibroblast protein synthesis. *Science* 236:1465-1469.
- Graham, M.F., R.F. Diegelmann, K.N. Bitar and H. P. Ehrlich (1987). Heparin modulates human intestinal smooth muscle cell proliferation, protein synthesis and lattice contraction. *Gastroenterology* 93:801-809.
- Wyler D.J., H.P. Ehrlich, A.E. Postlethwaite, R. Raghoebar, M. Murphy. (1987) Pathogenesis of fibrosis in schistosomiasis. Soluble products of murine hepatic egg granulomas stimulate collagen and fibronectin synthesis in vitro. *J. Immunol.* 138:1581-1586.
- Ehrlich, H.P. (1988) The role of connective tissue matrix in wound healing. *Prog. Clin. Biol. Res.* 266:243-258.
- Ehrlich H.P. W.K. Jung D.E. Costa J.B.M. Rajaratnam. (1988) Effects of heparin on vascularization of artificial skin grafts in rats. *Exp. Molec. Path.* 48:244-251.
- Ehrlich H.P. (1988) The modulation of contraction of fibroblast populated collagen lattices by types I, II, and III collagen. *Tiss. Cell* 20:47-50.
- Ehrlich, H.P. (1988) Wound closure: Evidence of cooperation between fibroblasts and collagen matrix in scar contracture. *Exp. Cell Res.* 171:149-157.

- Carter, E.A., Jung, W., Ehrlich, H.P., Ouellette, A. (1988) Thermal trauma and gastrointestinal function. III. Effect of hot and cold burn trauma to mice on small intestinal weight and mucosal mass. *J. Burn Care Rehab.* 9:351-353.
- Ehrlich, H.P., Buttle, D.J., Bernanke, D.H. (1989). Physiology variables affecting collagen lattice contraction by human dermal fibroblasts. *Exper. Molec. Pathol.* 50:220-229.
- Krummel TM, Ehrlich HP, Nelson JM, Michna BA, Thomas BL, Haynes JH, Cohen K, Diegelmann RF (1989) Fetal wounds do not contract in utero. *Surg Form* 11:613-615.
- Burd, DAR, Siebert JW, Ehrlich HP, Garg HG. (1989) Human skin and post-burn scar hyaluronan: Demonstration of the association with collagen and other proteins. *Matrix* 9:322-327.
- Hatz, R.A., Kelley, S.F., Ehrlich, H.P. (1989) The Tetrachlorodecaoxygen-complex reverses the effect of cortisone on wound healing. *Plast. Reconstr. Surg.* 84:953-959.
- Rockwell, W.B., Cohen, I.K., Ehrlich, H.P. (1989) Keloids and hypertrophic scar: A comprehensive review. *Plast. Reconst. Surg.* 84:827-837.
- Rockwell, W.B., H.P. Ehrlich (1990) Fibrinolysis inhibitor in human burn fluid. *J. Burn Care Rehab.* 11:1-6.
- Rockwell W.B., Ehrlich, H.P., (1990) Should burn blister fluid be evacuated? *J Burn Care Rehabil.* 11:93-95.
- Rockwell, W.B., Ehrlich, H.P. (1990) Ibuprofen in acute care therapy. *Ann. Surg.* 211:78-80.
- Rittenberg, T. Burd, D.A.R., Ehrlich H.P. (1990) Soluble factor(s) in rat wound fluid inhibit fibroblast populated lattice contraction. *Exp Mol Path* 52:132-14
- Siebert, J.W., D.A.R. Burd, J.G. McCarthy, J. Weinzweig, H.P. Ehrlich. 1990 Fetal wound Healing: A biochemical study of scarless healing. *Plast Reconst. Surg.* 85:495-502.
- Rowan, A.D., Christopher, C.W., Kelley, S.F., Buttle, D.J., Ehrlich, H.P. 1990 Debridement of experimental full-thickness skin burns of rat with enzyme fractions derived from pineapple stem. *Burns* 16:243-246.
- Kelley S.F., Felix, A.M., Ehrlich, H.P. 1990 The antagonism of glucocorticoid inhibition of wound healing in rats by growth hormone releasing factor. *Proc Soc. Exper. Biol. Med.* 194:320-326.
- Burd DAR, Longaker MT, Adzick MR, Harrison MR, Ehrlich HP 1990 Fetal wound healing in a large animal model: The deposition of collagen is confirmed. *Brit J Plast Surg* 43:571-577.
- Burd DAR, Longaker MT, Adzick NS, Compton CC, Harrison MR, Ehrlich HP. 1990 Fetal wound healing: An in vitro explant model. *J Ped Surg.* 25:898-901.
- Ehrlich, H.P., Rajaratnam, J.B.M. (1990) Cell locomotion forces versus cell contraction forces for collagen lattice contraction: An in vitro model of wound contraction. *Tiss Cell* 22:407-417.
- Ehrlich HP. Rockwell WB. Cornwell TL. Rajaratnam JB. 1991 Demonstration of a direct role for myosin light chain kinase in fibroblast-populated collagen lattice contraction. *J Cell Physiol* 146:1-7.
- Rockwell, W.B., Ehrlich, H.P. (1991) Release of plasmin-inhibitor by cultured human endothelial cells: Its antagonism by ibuprofen. *Exp Mol Pathol* 54:1-9.



- Burd DAR, Longaker MT, Rittenberg T, Adzick MR, Harrison MR, Ehrlich HP (1991) In vitro fetal wound contraction The effect of amniotic fluid. *Brit J Plast Surg* 44:302-305.
- Rittenberg, T., Longaker, M.T. Adzick, N.S., Ehrlich, H.P. (1991) Sheep amniotic fluid has a protein factor which stimulates human fibroblast populated collagen lattice contraction. *J Cell Physiol* 149:444-450.
- Madison JV, TB, Hamir AN, Ehrlich HP, Haberman J, Topkis O, Villasin JV (1991) Effects of a proprietary topical medication in wound healing and collagen deposition in horses. *Am J Vet Res* 52:1128-1131.
- Brown H, Ehrlich HP, Newberne PM, Kiyozumi T (1991) Animal models of human disease. Para Osteo Arthropathy. *Comp Path Bull* 22:2-4.
- Ragas, FC, Ehrlich, HP. (1992) Elucidating the vascular response to burns by a new rat model. *J Trauma* 32:557-563.
- Ehrlich, HP, Kelley, SF (1992) Documentation of hypertrophic scar development by laser doppler blood flow monitoring. *Plast. Reconstr. Surg.* 90:993-998.
- Greco, RM, Ehrlich, HP (1992) Cell division and thymidine incorporation with rat and primate fibroblasts in collagen. *Tiss. Cell* 24:843-851
- Rockwell WB, Ehrlich HP (1992) Reversible burn injury. *J. Burn Care Rehabil.* 13:403-406.
- Rittenberg T, Ehrlich HP. 1992 Free fatty acids and dialyzed serum alterations of fibroblast populated collagen lattice contraction. *Tiss Cell* 24:243-251.
- Choi, M, Ehrlich, HP (1993) U-75,412 E, a lazaroid, prevents progressive burn ischemia in a rat burn model. *Am J Path* 142:519-528.
- Krummel, T.M., Ehrlich, H.P., Nelson, J.M., Michna, B.A., Thomas, B.L., Haynes, J.H., Cohen, I.K., Diegelmann, R.F. (1993) In vitro and in vivo studies on the inability of fetal rabbit wounds to contract. *Wound Repair Regen* 1:15-21.
- Wider, T.M., Yager, J.S., Rittenberg, T., Hugo, N.E., Ehrlich, H.P. 1993 The inhibition of fibroblast populated collagen lattice contraction by human amniotic fluid: A chronologic examination. *Plast Reconstr Surg* 91:1287-1293
- Cepeda, M.S., Lipkowski, A.W., Langlade, A., Osgood, H.P., Ehrlich, H.P., Hargreaves, K., Szyfelbein, S.K., Carr, D.B. 1993 Local and systemic concentrations of beta-endorphin and corticosterone after thermal injury: Effects of opioid treatment. *Immunopharmacology* 25:205-213.
- Huang, D., Chang, T.R., Aggarwal, A., Lee, R.D., Ehrlich, H.P. 1993 Mechanisms and dynamics of mechanical strengthening in cell-populated collagen matrices. *Ann Biomed Eng* 21:111-128.
- Ehrlich, H.P., Desmouliere, A., Diegelmann, R.F., Cohen, I.K., Compton, C.C., Garner, W.L., Kapanci, Y., Gabbiani, G. 1994 Morphological and immunochemical differences between keloids and hypertrophic scar. *Am. J. Pathol.* 145:105-113.
- Orlandi, A., Ehrlich, H.P., Ropraz, P., Spagnoli, L.G., Gabbiani, G. 1994 Rat aortic smooth muscle cells isolated from different layers and at different times after endothelial denudation show distinct biological features in vitro. *Arterio. Throm.* 14:982-989.

- May, J.W., Bucky, L.P., Sohoni, S., Ehrlich, H.P. 1994 Smooth versus textured implants. A double blind study of capsule quality and pain in simultaneous bilateral breast reconstruction patients. *Ann. Plast. Surg.* 32:225-233.
- Blackburn, J.H., Blewett, C.J., Cilley, R.E., Dillon, P.W., Ehrlich, H.P., Krummel, T.M. 1994 Hyaluronan and inhibition of granulation tissue deposition. *Surg. Forum* 45:692-694.
- Zamora, R.L., Heights, R., Kraemer, B.A., Ehrlich, H.P., Groner, J.P. 1994 Presence of growth factors in palmar and plantar fibromatoses. *J. Hand Surg.* 19: 435-441.
- Bucky, L.P., Vedder, N.B., Hong, H.Z., Ehrlich, H.P., Harlan, J.M., May, Jr., J.W. 1994 Reduction of burn injury by inhibition of CD18-mediated leukocyte adherence in rabbits. *Plast. Reconstr. Surg.* 93:1473-1480.
- Bucky, L.P., Ehrlich, H.P., Sohoni, S., May, Jr., J.W. 1994 The capsule quality of saline-filled smooth silicone, textured silicone, and polyurethane implants in rabbits: a long-term study. *Plast. Reconstr. Surg.* 93:1123-1131.
- Ehrlich, H.P. (1995) Regulation der Wundheilung aus der Sicht des Bindegewebes. *Chirurg* 66:165-173
- Ehrlich HP (1995) Is collagen remodeling associated with bladder obstruction? *Adv Exp Med Biol* 385:143-149.
- Garner, W.L., Rittenberg, T., Ehrlich, H.P., Karniol, S., Rodriguez, J.L., Smith, Jr., D.J., Phan, S.N. (1995) Hypertrophic scar fibroblasts accelerate collagen gel contraction. *Wound Rep Regen* 3:185-191.
- Blewett, C.J., Cilley, R.E., Ehrlich, H.P., Dillon, P.W., Blackburn, J.H., Krummel, T.M. 1995 Regenerative healing of incisional wounds in murine fetal lungs maintained in organ culture. *J. Ped. Surg.* 30:945-948
- Choi, M., Rabb, H., Arnout, M.A., Ehrlich, H.P. 1995 Preventing the infiltration of leukocytes by monoclonal antibody blocks the development of progressive ischemia in rat burns. *Plast. Reconstr. Surg.* 96:1177-1185.
- Wyler, D., Prakash, S., Robbins, P., Bettinger, D., Diegelmann, R., Postlethwaite, A., Ehrlich, H.P. 1995 A novel granuloma-derived lymphokine (FsF-1/fibrosin) regulates multiple fibroblast functions in vitro. *Wound Rep. Reg.* 3:107-111.
- Ehrlich, HP, Krummel, TM. 1996 The regulation of wound healing from a connective tissue aspect. *Wound Rep Regen* 4:203-210.
- Iocono, J.A., Ehrlich, H.P., Allison, G.M., Keefer, K.A., Krummel, T.M. 1996 Hyaluronan (HA) alters the appearance of CD44 isoforms in granulation tissue: Implications for scarless repair. *Surg Forum* 47:341-344.
- Ehrlich, HP, Blewett, CJ, Krummel, TM, Cutroneo, KR. 1996 Inhibition of wound closure by transforming growth factor- $\beta$  and dexamethasone in a fetal mouse limb organ culture model. *Wound Rep Regen* 4:482-488
- Ehrlich, HP. Scar Contracture. 1997 *J. Urol.* 157:316-319.
- Meisler, N., Keefer, K.A., Ehrlich, H.P., Yager, D.R., Myers-Parrelli, J., Cutroneo, K.R. 1997 Dexamethasone abrogates the fibrogenic effect of transforming growth factor- $\beta$  in rat granuloma and granulation tissue fibroblasts. *J Invest Derm* 108:285-289.

- Chopra, V., Blewett, C.J., Ehrlich, H.P., Krummel, T.M. 1997 The transition from fetal to adult repair occurring in forelimbs maintained in organ culture. *Wound Rep Regen* 5:47-51.
- Cooney R, Iocono J, Maish G, Cohen A, Smith JS, Ehrlich, P 1997 Tumor necrosis factor mediates impaired wound healing in chronic abdominal sepsis. *J Trauma* 42:415-420.
- Blewett, C.J., Cilley, R.E., Ehrlich, H.P., Blackburn, J.H., Dillon, P.W., Krummel, T.M. 1997 Regenerative healing of incisional wounds with midgestation murine hearts in organ culture. *J Thorac. Cardiovasc. Surg* 113:880-885.
- Ehrlich HP. 1997 Granulation tissue maturation and wound contraction. *J Surg Pathol* 2:243-249.
- Brem H, Ehrlich HP, Tsakayannis D, Folkman J. 1997 The modulation angiogenesis during wound healing: Studies with the angiogenesis inhibitor TNP-470. *Surgical Forum* 48:714-716.
- Ehrlich HP. 1998 The physiology of wound healing. A summary of normal and abnormal wound healing processes. *Advances in Wound Care*. 11:326-328.
- Yager, J.S., Hugo, N.E. Ehrlich H.P. (1998) Inhibition of fibroblast-populated collagen lattice contraction by an albumin-bound lipid fraction from human amniotic fluid. *Plast Reconstr Surg* 101:6-11.
- Iocono JA, Ehrlich, HP, Keefer KA, Krummel TM. (1998) Hyaluronan induces scarless repair in mouse limb organ culture. *J Ped Surg* 33:584-587
- Keefer KA, Iocono JA, Ehrlich, HP 1998 Zinc-containing wound dressings encourage autolytic debridement of dermal burns. *Wounds* 10:54-58.
- Ehrlich HP, Cremona O, Gabbiani G, Allison GM. 1998 The expression of  $\alpha_2 \beta_1$  integrin and  $\alpha$  smooth muscle actin in fibroblasts grown on collagen. *Cell Biochem Funct* 16:129-137.
- Iocono JA, Bisignai GJ, Krummel TM, Ehrlich HP. 1998 Inhibiting the dedifferentiation of myocardiocytes by hyaluronic acid. *J Surg. Res* 76:111-116.
- Berry DP, Harding KG, Stanton M, Jasani B, Ehrlich HP. 1998 Human wound contraction: Collagen organization, fibroblast and myofibroblasts. *Plast Reconstr Surg* 102:124-131.
- Maish, III GO, Shumate ML, Ehrlich HP, Cooney RN. 1998 Tumor necrosis factor binding protein (TNFbp) improves incisional wound healing in sepsis. *J Surg. Res* 78:108-117.
- Bowman N, Donahue H, Ehrlich HP 1998 Gap junctional intercellular communication contribution to the contraction of rat osteoblast populated collagen lattices. *J Bone Min Res*.13:1700-1706.
- Greco RM, Iocono, J.A. Ehrlich HP. 1998 Hyaluronic acid stimulates human fibroblast proliferation within a collagen matrix. *J Cell. Physiol* 177:465-473
- Iocono JA, Ehrlich HP, Allison, GM, Krummel TM. 1998 Hyaluronidase expression of RHAMM receptor implications in repair. *Surg. Forum* 49:655-656
- Iocono JA, Krummel TM, Keefer KA, Allison, GM, Ehrlich HP. 1998 Repeated additions of hyaluronan alters granulation tissue deposition in sponge implants in mice. *Wound Rep Regen* 6:442-448.
- Beaubouef A, S Ordille, DR Erickson, HP Ehrlich. 1998 *In vitro* ligation of ureters and urethra modulates fetal mouse bladder explants development. *Tiss Cell* 30:531-536.

- Ehrlich HP, KA Keefer, RI Myers, A Passaniti. 1999 Wound contraction, vanadate and myofibroblasts. *Arch Surg* 134:494 – 501.
- Gorman PJ, Saggars G, Ehrlich HP, Mackay DR, Graham, III WP. 1999 Effects of topical nitroglycerin and flurbiprofen in the rat comb burn model. *Ann Plast Surg* (42:529-532).
- Maish, III GO, Shumate ML, Ehrlich HP, Cooney RN. 1999 Interleukin-1 receptor antagonist attenuates tumor necrosis factor induced alterations in wound breaking strength. *J Trauma* 47:533-537.
- Boemi LB, Allison GM, Graham WP, Ehrlich HP. 1999 Differences between scar and skin cultured fibroblasts derived from a patient with recurrent abdominal incision wound herniation *Plast Reconstr Surg* 104:1397-1405.
- Ehrlich HP, Allison GM, Page MJ, Kolton WA, Graham MF. 2000 Increased gelsolin expression and retarded collagen lattice contraction with Crohn's diseased intestinal smooth muscle cells. *J Cell Physiol* 182:303-309.
- Ehrlich HP, Gabbiani G, Meda P. 2000 Cell coupling, CX 43 expression and fibroblast populated collagen lattice contraction. *J Cell Physiol* 184:86-92.
- Stamm J, Cooney RN, Maish III, GO, Shumate, ML, Lang, CH, Ehrlich, HP, Vary, TC. 2000 Growth hormone does not attenuate the inhibitory effects of sepsis on wound healing. *Wound Rep Regen* 8:103-109.
- Iocono JA, Kolleran KR, Remick DG, Gillespie BW, Ehrlich HP, Garner WL. 2000 Interleukin-8 levels in delayed human thermal wounds: Inhibition of fibroblast-populated collagen lattices contraction and myosin ATPase activity. *Wound Rep Regen* 8:216-225.
- Hall WW, Wrye SW, Banducci DR, Ehrlich P. 2000 Microvascular anastomosis using 2-octyl cyanoacrylate in the rat femoral artery. *Ann Plast Surg*. 44:508-11.
- Ehrlich H P, Rittenberg T. 2000 Differences In The Mechanism For High Versus Moderate Density Fibroblast Populated Collagen Lattice Contraction. *J Cell Physiol* 185:432-439.
- Ghazarian A, Garner WL, Ehrlich HP. 2000 Memory of past exposure to the chemokine IL-8 inhibits the contraction of fibroblast populated collagen lattices. *Exp Mol Path* 69:242-247.
- Ehrlich HP, Keefer, KA, Maish, III GO, Myers RL, Mackay DR. 2001 The increased gain in wound breaking strength associated with more uniform deposited collagen fiber bundles in vanadate treated rats. *Plast Reconstr Surg* 107:471-477.
- Saggars, GC, Allison, GM, Levinson, H, Kramer, T, Mackay, DR, Ehrlich, HP 2001 The influence of anabolic steroid upon the expression of procollagen types I and III mRNA in human dermal fibroblasts cultured on collagen or plastic. *Wounds* 13:66-71.
- Dave SA, Banducci DR, Allison GM, Graham, WP III, Ehrlich HP. 2001 Cytoskeletal Differences Between Fibroblasts Derived from Dupuytren's Nodules And Cords. *Exp Mol Path* 71:147-155.
- Levinson H, Peled Z, Liu W, Longaker MT, Allison GM, Ehrlich HP. 2001 Fetal rat amniotic fluid: TGF- $\beta$  concentrations and modulation of fibroblast populated collagen lattice contraction. *J Surg Res* 100:205-210.
- Moyer KE., A. Davis, G.C. Saggars, D.R. Mackay, H.P Ehrlich. 2002 Wound healing: The role of gap junctional communications in rat granulation tissue maturation. *Exp Mol Path* 72:10-16.

- Moyer KE, DR Banducci, WP Graham, III, HP Ehrlich. 2002 Dupuytren's disease: changes in nodule and cord fibroblast physiology through *in vitro* aging. *Plast Reconstr Surg.* 110:187-193.
- Saba AA, Freedman BM, Gaffield JW, Mackay DR, Ehrlich HP. 2002 Topical platelet derived growth factor enhances wound closure in the absence of wound contraction: An experimental and clinical study. *Ann Plast Surg* 49:62-66
- Moyer K E., Saggars GC, Allison GM, Mackay DR, Ehrlich HP. 2002 The effect of Interleukin-8 on granulation tissue maturation. *J. Cell Physiol.* 193:173-179.
- Levinson, H, JE Hopper, HP Ehrlich. 2002 Over expression of integrin  $\alpha v$  promotes human osteosarcoma cell populated collagen lattice contraction and cell migration. *J Cell Physiol* 193:219-224.
- Ehrlich HP, Freedman BM. 2002 Topical platelet-derived growth factor in patients enhances wound closure in the absence of wound contraction. *Cytokines Cell Mol Ther.* 7:85-90.
- Brem H, Young J, Tomic-Canic M, Isaacs C, Ehrlich HP. 2003 Clinical efficacy and mechanism of bilayered living skin equivalent in treatment of diabetic foot ulcers. *Surg Technol Int* 11:23-31..
- Moyer KE, Ehrlich HP. 2003 Modulation of human fibroblast gap junction intercellular communication by hyaluronan. *J Cell Physiol* 196:65-670.
- Ehrlich HP. 2003 The fibroblast-populated collagen lattice. A model of fibroblast collagen interactions in repair. *Methods Mol Med.*;78:277-291
- Brem H, Tomic-Canic M, Tamovskaya A, Ehrlich HP, Baskin-Bey E, Gill K, Carasa M, Weinberger S, Entero H, Vladeck B. 2003 Healing of elderly patients with diabetic foot ulcers, venous stasis ulcers, and pressure ulcers. *Surg Technol Int*11:161-167.
- Ingraham JM, Hauck RM, Ehrlich HP. 2003 Is the tendon embryogenesis process resurrected during tendon healing? *Plast Reconstr Surg.*112:844-854.
- Ehrlich HP, Diez T. 2003 Role for gap junctional intercellular communications in wound repair. *Wound Repair Regen.*11:481-489.
- Mackay DJ, Moyer KE, Saggars GC, Myers RL, Mackay DR, Ehrlich HP. 2003 Topical vanadate optimizes collagen organization within granulation tissue. *Wound Repair Regen* 11:204-212.
- Peppas M, Brem H, Ehrlich P, Zhang JG, Cai W, Li Z, Croitoru A, Thung S, Vlassara H. 2003 Adverse effects of dietary glycotoxins on wound healing in genetically diabetic mice. *Diabetes.* 52:2805-2813
- Levinson H, Turner CE, Ehrlich HP. 2004 Integrin-linked kinase: a possible role in scar contracture. *Ann Plast Surg.*52:204-211.
- Hauck RM, Camp L, Ehrlich HP, Saggars GC, Banducci DR, Graham WP. 2004 Pulp nonfiction: microscopic anatomy of the digital pulp space. *Plast Reconstr Surg.* 113:536-539.
- Ehrlich HP. 2004 Understanding experimental biology of skin equivalent: from laboratory to clinical use in patients with burns and chronic wounds. *Am J Surg.*187:29S-33S.
- Moyer KE, Saggars GC, Ehrlich HP. 2004 Mast cells promote fibroblast populated collagen lattice contraction through gap junction intercellular communication. *Wound Repair Regen.*12:269-275.

- Levinson H, Sil AK, Conwell JE, Hopper JE, Ehrlich HP. 2004 Alpha V integrin prolongs collagenase production through Jun activation binding protein 1. *Ann Plast Surg.* 53:155-161
- Ehrmantant WR, Graham WP 3rd, Towfighi J, Mackay DR, Ehrlich HP. 2004 A histological and anatomical profile of pacinian corpuscles from Dupuytren's contracture and the expression of nerve growth factor receptor. *Plast Reconstr Surg.* 114:721-727.
- Levinson H, Moyer KE, Saggars GC, Ehrlich HP. 2004 Calmodulin-myosin light chain kinase inhibition changes fibroblast-populated collagen lattice contraction, cell migration, focal adhesion formation, and wound contraction. *Wound Repair Regen.* 12:505-511.
- Ehrlich HP, Lambert PA, Saggars GC, Myers RL, Hauck RM. 2005 Dynamic changes appearing in collagen fibers during intrinsic tendon repair. *Ann Plast Surg.* 54:201-206.
- Orlandi A, Ferlosio A, Gabbiani G, Spagnoli LG, Ehrlich HP. 2005 Phenotypic heterogeneity influences the behaviour of rat aortic smooth muscle cells in collagen lattice. *Exp Cell Res* 311:317-327
- Ehrlich HP, Allison GM, Leggett M. 2006 The myofibroblast, cadherin, alpha smooth muscle actin and the collagen effect. *Cell Biochem Funct.* 26:63-70.
- Ehrlich HP, Sun B, Saggars GC, Kromath F. 2006 Gap junction communications influence upon fibroblast synthesis of type I collagen and fibronectin. *J Cell Biochem* 98:735-743.
- Cutroneo KR, White S, Chiu JF, Ehrlich HP. 2006 Tissue fibrosis and carcinogenesis: divergent or successive pathways dictate: Multiple molecular therapeutic targets for oligo decoy therapies. *J Cell Biochem* 97:1161-1174.
- Cutroneo KR, Ehrlich HP. 2006 Silencing or knocking out eukaryotic gene expression by oligodeoxynucleotide decoys. *Crit Rev Eukar Gene Express* 16:23-30.
- Paul Ehrlich H. (*Ehrlich HP*), Sun B, Kainth KS, Kromath F. 2006 Elucidating the mechanism of wound contraction attached-delayed-released compared to free-floating fibroblast populated collagen lattices: Rapid versus sustained myosin ATPase activity. *Wound Repair Regen* 14:625-632.
- Cutroneo KR, White S, Chiu JF, Buttolph T, Allison G, Ehrlich HP. 2007 Phenotypic expression of human hepatoma cells in culture. *J Cell Biochem.* 100:1081-1085
- Au SR, Au K, Saggars GC, Karne N, Ehrlich HP. 2007 Rat mast cells communicate with fibroblasts via gap junction intercellular communications. *J Cell Biochem.* 100:1170-1177.
- Ehrlich HP, Phan SH, White SL, Cutroneo KR. 2007 Therapies for bleomycin induced lung fibrosis through regulation of TGF- $\beta$ 1 induced collagen gene expression. *J Cell Physiol* 211:585 - 589.
- Brem H, Tomic-Canic M, Entero H, Hanflik AM, Wang VM, Fallon J, Ehrlich HP. 2007 The synergism of age and db/db genotype impairs wound healing. *Expl Gerontol* 42:523-531.
- Au K, Ehrlich HP. 2007 Does rat granulation tissue maturation involve gap junction communications? *Plast Reconstr Surg.* 120:91-99.
- Lok CN, Ehrlich HP, White SL, Buttolph TR, Cutroneo KR, Chiu JF. 2008 Oligodeoxynucleotide decoy therapy blocks type 1 procollagen transcription and the prolyl hydroxylase beta subunit translation. *J Cell Biochem* 103:1066-1075.

- Bouffard NA, Cutroneo KR, Badger GJ, White SL, Buttolph TR, Ehrlich HP, Stevens-Tuttle D, Langevin HM. 2008 Tissue stretch decreases TGF- $\beta$ 1 and type-1 procollagen in mouse subcutaneous connective tissue: Evidence from ex vivo and in vivo models. *J Cell Physiol*.214:389-395.
- Lee, M, Ehrlich, HP. 2008 Influence of vanadate on migrating fibroblast orientation within a fibrin matrix. *J. Cell Physiol* 217:72-76.
- Dallon JC, Ehrlich HP 2008 A review of fibroblast populated collagen lattices. *Wound Repair Regen*. 16:472-479.
- Bao P, Kodra A, Tomic-Canic M, Golinko MS, Ehrlich HP, Brem H. 2009 The role of vascular endothelial growth factor in wound healing. *J Surg Res*. 153:347-358 PMID: 19027922
- Orgill DP, Manders EK, Sumpio BE, Lee RC, Attinger CE, Gurtner GC, Ehrlich HP, 2009 The mechanisms of action of vacuum assisted closure: More to learn. *Surgery*. 146: 40-51. PMID: 19541009
- Brem H, Kodra A, Golinko MS, Entero H, Stojadinovic O, Wang VM, Sheahan CM, Weinberg AD, Woo SL, Ehrlich HP, Tomic-Canic M. 2009 Mechanism of Sustained Release of Vascular Endothelial Growth Factor in Accelerating Experimental Diabetic Healing. *J Invest Dermatol*. PMID: 19282838
- Ehrlich HP, Hazard SW, III. 2010 Thymosin $\beta$ 4 enhances repair through the organization of connective tissue and preventing the appearance of myofibroblasts. *The Ann N Y Acad Sci*.1194:118-124 PMID: 20536458
- Ort SA, Ehrlich HP, Isaacson JE. 2010 Acellular Porcine Intestinal Submucosa as Fascial Graft in an Animal Model: Possible Applications for Revision Tympanoplasty. *Otolaryngol-Head Neck Surg*. 143(3):435-40.PMID: 20723784
- Dallon JC, Ehrlich HP. 2010 Differences in the Mechanism of Collagen Lattice Contraction by Myofibroblasts and Smooth Muscle Cells. *J Cell Biochem* 111:362-369. PMID: 20506308
- Rosensteel SM, Wilson RP, White SL, Ehrlich HP. 2010 COL1A1 oligodeoxynucleotides decoy: Biochemical and morphologic effects in an acute wound repair model. *Exp Mol Pathol* 89:307-313. PMID: 20647009
- Au K, Ehrlich,HP 2010 When the smad signaling pathway is impaired, fibroblasts advance open wound contraction. *Exp Mol Pathol*. 89:236-40.PMID: 20705067
- Foley TT, Saggars GC, Moyer KE, Ehrlich HP 2011 Rat mast cells enhance fibroblast proliferation and fibroblast-populated collagen lattice contraction through gap junctional intercellular communications. *Plast Reconstr Surg*. (in press)
- Pistorio AL Ehrlich HP 2011 Modulatory Effects of connexin-43 expression on gap junction intercellular communications with mast cells and fibroblasts. *J Cell Biochem* (Accepted).